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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/679,787	10/06/2003	Kejun Zeng	TI-36531	3730
23494 7590 08/13/2007 TEXAS INSTRUMENTS INCORPORATED P O BOX 655474, M/S 3999 DALLAS, TX 75265			EXAMINER KERNS, KEVIN P	
			ART UNIT 1725	PAPER NUMBER
			NOTIFICATION DATE 08/13/2007	DELIVERY MODE ELECTRONIC

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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/679,787
Filing Date: October 06, 2003
Appellant(s): ZENG, KEJUN

MAILED
AUG 13 2007
GROUP 1700

Yingsheng Tung
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 4/16/07 appealing from the Office
action mailed 2/13/06.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

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(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,180,265	ERICKSON	1-2001
6,445,069	LING ET AL.	9-2002
6,452,270	HUANG	9-2002

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,180,265 (Erickson) in view of US 6,445,069 (Ling).

Erickson teaches aluminum connection site (figure 3, item 12); a nickel layer on the aluminum connection site contacting the top surface (figure 3, item 24); a copper layer atop and in contact with the nickel layer (figure 3, item 22) and a solder ball

contacting the copper layer forming a bond (figure 3, item 26). Ling teaches the interchangeability of pad material between aluminum and copper prior to plating with nickel (col. 4, ll. 35-45).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the pad material to utilize copper in order to provide better thermal conductivity (see Ling col. 1, ll. 5-15). With respect to the claimed copper layer thickness, it is the examiner's position that it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the thickness of the copper layer to the claimed range in order to provide a suitable copper wetting layer for the solder (see Erickson col. 4, ll. 10-25). Alternatively, Erickson teaches using copper and nickel to perform a particular task. It would have been obvious to one of ordinary skill in the art at the time of the invention to choose the instantly claimed ranges through process optimization, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. See In re Boesch, 205 USPQ 215 (CCPA 1980).

3. Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over 6,180,265 (Erickson) and US 6,445,069 (Ling) as applied to claim 32 above, and further in view of US 6,452,270 (Huang). Huang teaches the use of a pb/sn solder (coll. 4, ll. 10-25). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combined invention of Erickson and Ling to utilize the pb/sn solder in order to effectively form a bond to the semiconductor device (see Huang col. 4,

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II. 1-20). It is the examiner's position that since the prior art uses substantially the same metal layers coupled with substantially the same solder (i.e., tin based solder) as in the instant application, the particular CuSn will necessarily be present. When the examiner has reason to believe that functional language asserted to be critical for establishing novelty in claimed subject matter may, in fact may be a characteristic of the prior art, the burden of proof is shifted to the applicant to prove that the subject matter shown in the prior art does not possess the characteristics relied upon. *In re Fitzgerald et al.* 205 USPQ 594.

(10) Response to Argument

With regard to the appellant's remarks/arguments on pages 3 and 4 of the Appeal Brief, the appellant states that the 35 USC 103(a) rejection of independent claim 32 (see above section 2. in the (9) Grounds of Rejection section) is allegedly improper due to the following three arguments (hereafter Arguments 1, 2, and 3):

1) the references cited in the Office Action fail to provide suggestion, incentive, or motivation to combine the teachings suggested in the Office Action;

2) a combination of the teachings in the references cited in the Office Action would destroy the intent of the invention disclosed; and

3) the references cited in the Office Action fail to recognize the problem solved in the invention.

The examiner respectfully disagrees with the appellant on all three arguments as follows:

1) Regarding Argument 1 (see page 3 of the brief), the appellant states that the combination of Erickson and Ling et al. fails to provide suggestion, incentive, or motivation to combine the teachings. First, it is noted that Erickson disclose all features of the solder joint structure of independent claim 32 (inclusive of nickel layer 24 adjacent top copper layer 22, and solder ball 26 atop the top copper layer 22) with the exception of the copper pad (item 14 of appellant's Figures 2A and 2B). Instead, Erickson teaches an aluminum pad 12 (Figure 3 of Erickson). However, Ling et al. disclose the interchangeability of the pad (between aluminum and copper) prior to plating with a nickel layer (Ling et al.; column 4, lines 35-45; and Figure 1), with the use of copper as the pad material being advantageous for providing better thermal conductivity (Ling et al.; column 1, lines 5-11). In view of the appellant's argument in the last paragraph of Argument 1, the appellant suggests that there is no reason to combine the references regarding substitution of aluminum for copper as the pad material. In response to the appellant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Ling et al. provide a distinct motivation for use of a copper pad for obtaining better thermal conductivity (Ling et al.; column 1, lines 5-11). As a result, the improved thermal conductivity of the copper pad

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of Ling et al. over Erickson's aluminum pad provides distinct suggestion, incentive, and motivation to combine the references, as one of ordinary skill in the art would recognize.

2) Regarding Argument 2 (see pages 3 and 4 of the brief), the appellant states that the combination of Erickson and Ling et al. would destroy the intent of the invention disclosed. In response to this argument, it is noted that the appellant is merely providing arguments addressing the "intent of use" of the invention, rather than the solder joint structure (article/product) itself. The appellant is merely stating that the invention has advantageous "functional" features/properties, but these "functional" features/properties are stated in the absence of "structural" features, as would be required for potential patentability of independent claim 32. Furthermore, the appellant is generally attacking the Erickson and Ling et al. references individually in this "destroy the intent" argument, rather than the teachings of the references when taken as a whole. In response to appellant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). The examiner respectfully disagrees with the appellant's "destroy the intent" argument, as the combination of references as taken together disclose and/or suggest all structural features of claim 32, inclusive of the distinct motivation of improved thermal conductivity of the copper pad of Ling et al. in lieu of an aluminum pad of Erickson.

3) Regarding Argument 3 (see page 4 of the brief), the appellant states that the combination of Erickson and Ling et al. fails to recognize the problem solved in the

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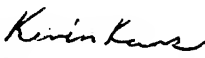
invention. In addressing this argument in the last paragraph of page 4 of the brief, it is noted that the appellant is merely stating a problem to be overcome by his invention in view of the prior art. Specifically, and as discussed in paragraph [022] and [023] of the appellant's specification, the appellant seeks to avoid formation of excessive Kirkendall voids, which tend to degrade reliability of integrated circuit (IC) devices. Although the examiner recognizes the appellant's problems to be solved over the prior art, the appellant has not provided an affidavit/declaration throughout prosecution to show potential advantageous features and/or unexpected results of the appellant's invention. In other words, the appellant has not provided any evidence that would be sufficient to overcome the 35 USC 103(a) rejections in view of the combination of Erickson and Ling et al. In the absence of such evidence, the 35 USC 103(a) rejections continue to be properly applied, and thus the rejections should be sustained.


(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Kevin P. Kerns 
Primary Examiner
AU 1725

Conferees:
Jonathan Johnson 
Patrick Ryan 